



# UNITED STATES NAVY

## Medical News Letter

Vol. 50

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No. 6

### Surgeons General of the Past

(The twentieth in a series of brief biographies)



Edward Rhodes Stitt was born in Charlotte, North Carolina on 22 July 1867, was graduated from the University of South Carolina, and received his medical degree from the University of Pennsylvania. He was appointed Assistant Surgeon in the Navy on 3 April 1889, and was on the *Baltimore* in the White Squadron when that ship visited Valparaiso during the violent Balmacedist revolution. He next had duty aboard the *Franklin*, at the Norfolk Naval Hospital, and in the New York, Bache and Vermont. After the country's acquisition of various island possessions, Dr. Stitt made notable contributions to the field of tropical medicine. He studied under Sir Patrick Manson in London and observed tropical diseases on a trip to the Pacific area, later teaching the subject and directing laboratory work at the newly founded Naval Medical School. He assumed command of the School 18 September 1916 and served there, in the rank of Rear Admiral, during World War I. For his exceptionally meritorious service he was awarded the Navy Cross. On 30 September 1920 Admiral Stitt assumed duty as the 16th Surgeon General of the Navy and 20th Chief of the Bureau of Medicine and Surgery, serving until 30 November 1928. During his administration Aviation Medicine became a recognized specialty, the largest naval hospital up to that time was built and commissioned at San Diego. Rear Admiral Stitt's two textbooks *Practical Bacteriology, Haematology, and Animal Parasitology*, and *Diagnosis and Treatment of Tropical Diseases* made his name distinguished around the world. He was a President of the American Society of Tropical Medicine, and taught at several universities. He was retired from the Navy 1 August 1931, was a medical consultant to the military services in World War II, and died 13 November 1948.

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**MEDICAL NEWS LETTER**

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The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

## YOUR REPUTATION

Robert W. Virtue MD, *JAMA* 198(13):1344-1346, Dec 26, 1966.

In considering the future of anesthesiology, I would like to begin by mentioning a few pertinent items that have recently appeared in print. One is from the *AMA News*, and is a quotation from our president, James Z. Appel, MD: "Physicians as individuals and as a group must constantly bear in mind the basic principle that the primary object of the medical profession is to render service to humanity." As you consider this, do you honestly believe that you personally have a reputation for doing this? I hope and trust that we here today have such reputations, and that we enjoy life because we are enjoying the giving of such service.

A second item comes from the note in *Lancet*, written by a former psychiatric patient, who said:

I was chiefly struck by the godlike detachment of the hospital physicians. They thought they could cure anything with drugs and shock, in much the same way that a mechanic tackles engine repair.—Once a week the doctor came around, an occasion of some importance in hospital life. Since I wanted to get out quickly I never answered anything but "fine" when asked how I felt. This was my only direct contact with the medical staff.—I hope you don't feel I am making a specific complaint against the hospital. I was in a very bad way and I am grateful to the people who looked after me,—but I have had to drag myself back to normal life in a way that would not have been necessary if there had been more sympathetic contact with the doctors and less blind faith in drugs and shock.—Certainly a drugged patient behaves very quietly and appears very calm, but in my experience the mental torment is worse than the height of the delirium. The only reason you are quiet is because you don't know what the devil to do with yourself. Some sign from the doctors that they understood how you feel would be of a great help.

You do have a reputation with your patients. What kind is it?

### Patient Relationships

E. A. Osius, MD, in his McClure memorial lecture reminds us that

The older doctor's knowledge was not always deep, but his interests were wide and human. . . . Have we become so imbued with our progress and skills that we are becoming disdainful of the ordinary wants of the public? Is the average patient interested in the molecular pattern of a drug, or is he looking for a sympathetic personal physician upon whom he can unload his burdens to achieve well-being? . . . History-taking is the beginning of the art of medicine, and here is where the doctor and patient meet and get to know each other. A patient's confidence and trust often stems from this contact. This is the time and opportunity to show interest, concern and understanding for the patient and to gain his confidence and respect.

Do you, as anesthesiologists, have a reputation for creating this type of relationship with your patients? You do have some type of reputation with your patients. Your work as a physician ensures your having contact with nurses, other hospital personnel, with the parents of younger patients, and with obstetricians, surgeons, and internists. All these people have some opinion about you. This reputation will be what you make it.

A mother related that her child had been dragged from her arms by a nurse prior to a surgical procedure and taken to the operating room where a mask had been forced on the child's face. The child was terrorized for months after on seeing a hospital uniform. The same mother, telling of a second operative experience for the child, spoke of her pleasant surprise in finding a young doctor holding her child on his lap the day before surgery and letting the child play "spaceman." Do *you* have a reputation that might be brought to mind by either incident? You do have some sort of reputation, and this is something that you do control. What control do you use?

From the University of Colorado Medical Center, Denver.  
Adapted from a chairman's address read before the Section of Anesthesiology at the 115th annual convention of the American Medical Association, Chicago, June 28, 1966.



## Professional Development

Are you happy with the present practice and status of medicine? If not, what are you doing to improve it? Are you initiating some course of action? If so, you'll be respected for trying. If not, you'll surely have a reputation for not trying. You can't avoid a reputation of some kind. It is said that responsibility is the first step toward maturity. A child will stumble over a toy and blame the toy for hurting its toes. Mature persons accept more responsibility for their actions. A few years ago a physician told me about putting a patient into apnea with thiopental sodium and then finding that his oxygen tank was empty. He said, "Wasn't that the darndest luck?" Do *you* blame bad luck for your mistakes? Alexander Graham Bell once complained to Joseph Henry, head of the Smithsonian Institute, that lack of knowledge of electricity hampered him. Henry was not sympathetic, but suggested that Bell *get* such knowledge. You know the results. Anyone can make excuses or blame some handicap if he wants to, but a mature physician will prefer results to excuses. Let's not make a handicap an alibi for disaster.

Do you consider a man who has just completed his internship to be a fully seasoned physician? Dean Atchley of Columbia stated that the education of a professional man never ceases. This requires ongoing progressive activity. In medical school you received a background that was a heritage from many physicians. Have you added to this heritage? Have you enhanced the art of medicine? Are you known for your improving patient relations? What are you doing to deserve and improve this heritage? Do you earn the respect that is accorded to physicians? Is your relationship to medicine like that suggested by a preacher who said to a farmer, "The Lord certainly gave you a wonderful field this year." Or are you like the farmer who replied, "Yes, but you should have seen this field when the Lord had it all to himself."

To be a successful modern physician one must (a) keep up to date with the progress of medicine, (b) think creatively, and (c) be efficient in his own efforts. Keeping up to date will require continuing effort. In every decade since 1920 there have been pronounced advances in anesthesia. Ethylene was introduced in the twenties, cyclopropane and thiopental in the thirties, curare in the forties, halogenated agents in the fifties, and although it's a bit early to judge the sixties, one can be sure that developments are now accelerated. One should assume that his practice five years hence will differ from what it

is now. He *must* advance or fall behind. Osler stated, "A physician who does not use books and journals, who does not need a library, soon sinks to a level of the cross-counter practitioner, not alone in practice but in the mercenary feelings and habits which characterize a trade."

Thinking creatively seems to be, according to Gregg, "... the perception of relationships not at first apparent." These newly perceived relationships are then put into a new arrangement so that something new has appeared. Halley the astronomer passed a graveyard and suddenly surmised that if he got all the ages off the headstones he might formulate a table which would give a life span for the human race. This led to our life tables and the basis for the life insurance business. The new arrangement wasn't complicated; someone simply had to think about it.

Efficiency in thinking covers many facets. Many physicians leave general practice for a specialty in medicine because the variety of problems in general practice seems to prohibit thorough investigation of each one. Specialization permits concentrations on an aspect of medicine for which the physician has a particular talent or liking. A physician who specializes must take care that he does not become simply a technician within a monotonous sphere. To this point, when you're administering an anesthetic do you think of the partial pressure of the agent being given? Do you think of the degree of shunt, or the alveolar ventilation that may be present? Do you have in mind the chemical reaction occurring in the soda lime canister? Do you consider the fate of the thiopental given? Are you aware of the circumstances under which the patient will recover, or many other things, or are you a technician?

## Contacts with Physicians

Does your relationship with other physicians satisfy all concerned? Follett wrote in 1940 that consent of the governed is not democracy, and that agreement is a slow process that is more than consent. It includes participation and growth. This participation might be obtained in any of three ways. The first is domination, in which one man gets what he wants. The second is compromise in no man gets what he wants. The third is participation with integration, which involves finding a method whereby both groups get their way. This requires thinking and effort, and produces progress. Participation should not be self-sacrifice, but self-contribution. This contribution, to be valuable, must be related to the contributions of others concerned.



In thinking of your reputation, don't sell yourself short. In spite of talk about not having enough physicians there is a greater growth of numbers of physicians than of the general population. In the last 40 years, the population of the United States has gone up 76 percent, while the number of physicians has increased 117 percent. In the past decade medical school enrollment rose 23 percent while the population increased 16.4 percent. Moreover, the physicians are more efficient in curing disease. Consider a physician before 1940 sitting up with a patient to treat his pneumonia. How much more efficient is the physician who has penicillin! This was a product made available by efforts of physicians! In decades not so far gone, what was the chance of a patient who had tuberculosis, heart disease, syphilis, diphtheria, typhoid fever, or diabetes, to name a few? Cures of prevention have come about through the efforts of physicians, and we should toot our collective horns and rejoice in this progress. And as anesthesiologists, don't sell yourselves short. In 1965 Keown reminded us that anesthesiology ranks eighth in numbers involved in the specialty, in number of medical school faculty members, in number of approved residencies, and that this position had developed essentially since 1937. We are a young and vigorous group; I trust we are sufficiently mature (responsible) to maintain this growth. Indeed, the public demands our growth. Science and medical writers are much more prolific—and accurate—than in years past. We know that among our most current journals are the popular magazines, some of which have done a particularly good job of making people aware of medical advances. Much of this is good, for it not only acts as a stimulus for us, but also lets us know what people are thinking. And speaking of stimulus, let's recall Osler's admonition:

No class of men need friction so much as physicians; and no class gets less. The daily round of a busy practitioner tends to develop an egoism of a most intense kind to which there is no antidote. The

few setbacks are forgotten and mistakes are often buried, and ten years of successful work tends to make a man dogmatic, intolerant of correction, and abominably self-centered. To this mental attitude the medical society is the best corrective and a man misses a good part of his education who does not get knocked about a bit by his colleagues in discussion.

#### Our Future

I'd like to leave three ideas for your consideration for advancement of the practice of anesthesiology. All three require some effort and thought and all three will be rewarding. The first concept is that each and every patient provides an opportunity to give our precise and concentrated thoughts, rather than being "another case." The second idea is a matter of studying what goes on in each and every patient as he is under treatment. An example of this concept was stated by Eckenhoff:

The anesthesiologist has a unique opportunity for study of consciousness. Nearly all the agents used alter the level of consciousness. Perhaps an exhumation of the relations of the anesthetics to the levels of consciousness is long overdue. Observations accurately recorded by a disconcerting anesthetist could supply important data on the functioning of the nervous system.

This is an attitude of research that each and every one of us can apply. The third is a spirit of cooperation between each individual anesthesiologist and the American Medical Association. It's very much like marriage. If one either dominates or fails to help the other, it's no good. If it's a matter of "us" working together, it's wonderful.

What type of reputation are you developing? Our reputations collectively will be the future of anesthesiology.

#### Generic and Trade Names of Drug

Thiopental sodium—*Pentothal Sodium*.

(The references may be seen in the original article.)

## STUDIES ON LEPROSY

*CDR Ransom J. Arthur, MC USN, (TAD) Office of Naval Research, London.*

A study of leprosy may seem a concern remote from the interests of the Department of Anatomy and certainly from those of the psychiatrist. Never-

theless, the work carried on at Oxford in this regard is so exciting that it is worth reporting. A.G.N. Wedell, E. Palmer, and others have been studying

the problem of leprosy for 16 years. The causative organism was described as early as 1874. However, remarkably little has been known about the pathogenesis of the disease, even though it is one still of great importance in tropical regions. The work of the Oxford group is of a fundamental kind, very rare to encounter so late in the 20th century, since what they have done is to elucidate some of the basic mechanisms of the disease and in that they have had the opportunity open to the leaders in bacteriology and pathology of the 19th century.

There are two definite polar syndromes seen in leprosy although there very often are intermediate cases. The first classical variety is the tuberculoid type which simply is an area of hypopigmentation and anesthesia on the skin of an extremity. The lesion is a chronic granuloma that contains a few organisms and is apparently self-limited. However, when biopsies of nerves not only on the side of the region but also on the opposite side of the body were studied, the group was able to demonstrate the presence of *M. leprae* in the Schwann cells of the nerve trunks on both sides of the body. Curiously enough, the nerves can look quite disrupted under the microscope and yet apparently have perfectly efficient nerve conduction.

The other classical type of leprosy, lepromatous type, begins with an early rash. The investigators were able to confirm that at the period of the early rash the skin cells are loaded with the bacteria of leprosy. If one treats the patient with sulfones at that time, one can kill the organism, but often there is a severe reaction to the killed bacteria and the nerves are destroyed by scarring. A major breakthrough in studying the disease was the discovery of an animal site in which human leprosy bacilli could be grown and would multiply. This work was begun in the United States by C. C. Shepard and extended in England by the Oxford group. It was found that the leprosy bacillus would grow in the footpad of mice treated by thymectomy and X-radiation so as to extinguish immune mechanisms. The successful transmission of *M. leprae* to animals offered for the first time an opportunity for examining human leprosy experimentally. Estimates of the number of bacteria could be made by examining homogenates of infected mouse tissue under a microscope and by using a blood cell counting chamber, quite accurate and reliable estimates of bacterial multiplication could be done. If one inoculates the bacteria into mice, one sees that the organism goes first into skeletal muscle and then later is taken up by the Schwann cells of the various nerves as well as by the skin.

As a result of these studies and other evidence, it is now felt that leprosy, which has a very long apparent incubation period, is not a disease of low degree of infectivity as had been formerly believed, but rather a disease of potentially very great infectiousness. The variations in the clinical course of the disease appear to be correlated with (1) the severity of the infection, that is the amount of the inoculum of organisms; (2) natural immunity, probably genetic in origin; and (3) racial immunity. For example, leprosy in the Negro is very often of the harmless tuberculoid type, whereas in the Caucasian and Oriental, it may more often take the form of the lepromatous, severe variety. With the data from laboratory studies indicating the early appearance of the organism in the skin and skeletal muscle, investigators are now in the process of setting up field trials in Malaysia in which the sulfones will be given to individuals such as children in whom the organism has not yet massively invaded the nerve trunks. It would seem that if the organisms could be destroyed prior to invading the nerves, then the tragic forms of the disease could be prevented. In areas such as Malaysia, leprosy still constitutes a very major public health problem and its prevention would result in the alleviation of much human suffering.

#### Conclusion

The Oxford anatomists and neuroendocrinologists are characterized by their pursuit of the answers to certain fundamental biological questions, such as the relationship of the central nervous system and the endocrine system. They have been prepared to take long-term approaches rather than going for the short-term pay-off. Their work is representative of the splendidly meticulous, carefully organized, painstaking, and imaginative research that has given the world such brilliant physiological insights as those provided by Sir Charles Sherrington, Le Gros Clark, or Starling. The demonstration of the mechanisms by which the brain directly influences body hormones and through them the various target organs is of fundamental biological importance. This work is very difficult to perform and requires great delicacy, patience, and the ability to tolerate the disappointments inherent in any biological work. The housing and care of the animals, the development of techniques of measuring their biochemical and physiological dimensions, construction of appropriate instruments, etc., represent a very large investment in time, work, and treasure, but the results handsomely repay the cost.

## THERAPY OF ANAPHYLAXIS\*

*Albert L. Sheffer MD,† Boston, New Eng J Med 275 (19): 1059-1061, November 10, 1966. Reproduced with permission of The New England Journal of Medicine.*

The anaphylactic reaction, often explosive in onset, may vary from mild pruritic symptoms to irreversible shock and fatal pulmonary insufficiency. These acute systemic manifestations follow readministration of an antigen to a previously sensitized person.

### Pathogenesis

Anaphylaxis is consequent to the release of highly reactive pharmacologic substances acting upon smooth muscle and vasculature. Histamine, serotonin, plasma kinins (kallidin I, kallidin II), and slow-reacting substance (SRS-A) are the primary mediators of the anaphylactic response. Histamine induces angioneurotic edema, hypotension and erythema in human beings when various histamine releasers are administered. Pretreatment with antihistamines will abolish these symptoms, but the drugs are ineffective when administered after the onset of symptoms. Slow-reacting substance (SRS-A), a potent bronchoconstrictor uninhibited by antihistamines, has been released in vitro by lung tissue prepared from pollen-sensitive atopic patients. A definitive role in man for the vasoactive peptides is yet to be defined. However, profound hypotension occurs when these peptides are given to animals. Antigen interacts with the anaphylactic antibody presumably upon the surface of a few target cells, the mast cell being one type. The anaphylactic antibody, probably identical with the skin-sensitizing or reaginic antibody, is a unique 7S gamma globulin. It can be distinguished from the classic antibody, immunoglobulin G ( $\gamma$  G), by its rapid migration in an electrophoretic field. This reaginic activity is associated with immunoglobulin E ( $\gamma$  E). However, similar skin-sensitizing properties have been identified with the immunoglobulin G fraction as well.

### Symptomatology

Characteristically, anaphylaxis involves the skin (pruritus, urticaria and angioneurotic edema), respiratory tract (pulmonary insufficiency resulting from bronchospasm and obstruction of the upper respiratory tract), gastrointestinal tract (nausea, vomiting, colic and diarrhea) and cardiovascular system (hypotension). Post-mortem examination shortly after death demonstrates obstruction of the upper respiratory tract, in addition to generalized visceral engorgement and emphysema. The striking edema involving the epiglottis, hypopharynx and larynx suggests that the upper respiratory tract may be the site of anaphylactic-shock tissue in man. These changes are unique for the human being and have not been observed in other species. Acute emphysema, presumably consequent to bronchospasm and bronchial edema, has been the usual change involving the lower respiratory tract. No definitive pathologic changes have been demonstrable in patients with profound irreversible hypotension who died suddenly.

### Etiology

Innumerable agents incriminated as etiologic factors of anaphylactic shock have been classified as protein, polysaccharide or haptene (small-molecular-weight substances requiring protein carrier) and antigens. *Protein antigens* include heterologous serum (horse antitoxin), biologic products (ACTH, insulin and animal-hormone products), enzymes, stinging insects (hymenoptera) and therapeutic extracts of grasses, trees, ragweed and various foods. *Polysaccharide sensitivity* is seen in association with administration of dextran. *Haptenes* include various dyes administered for diagnostic technics (brom-sulfalein, iodinated organic contrast agents), sodium dehydrocholate (Decholin) and drugs (penicillin, salicylates and aminopyrine).

### Prophylaxis

The successful management of anaphylaxis requires anticipation of an adverse reaction whenever

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a therapeutic program is instituted. It is imperative that all patients be questioned regarding *previous drug reactions* with particular emphasis upon the specific drug or test substance to be administered. The most insignificant prior reaction must be given careful consideration before that drug or any chemically related medicament is administered. Inquiry should be made for a personal or a family history of *atopy* (hay fever, asthma or eczema). Persons so afflicted experience serious drug reactions more frequently than those with no history of atopy.

Any history of an adverse drug reaction requires *substitution* of a chemically unrelated compound for the allergen. This includes the use of propoxyphene hydrochloride (Darvon) or acetaminophen (Tylenol) for acetylsalicylic acid (aspirin), cephalosporin, or cephalothin (Keflin), for penicillin, xylocaine for procaine and hyperimmune human tetanus antitoxin instead of heterologous antitoxin. Medication should be administered orally in the *lowest* possible dosage when feasible.

Corroboration of a significant history of reaction by skin testing may produce a fatal reaction. Only patients without a previous history of adverse reaction to the specific medication should be so studied. Appropriate facilities for treating an anaphylactic reaction must be available. These include a drug tray containing epinephrine 1:1000, aminophylline, diphenhydramine (Benadryl) for parenteral administration, levarterenol, hydrocortisone sodium succinate, isotonic saline solution with appropriate intravenous adapters, needles and tourniquets, as well as facilities for endotracheal intubation and tracheostomy. When one is testing for drug hypersensitivity, an intravenous infusion is placed in the opposite arm until the appropriate drug has been administered without reactivity for at least thirty minutes. Initially, low-antigen-concentration scratch tests are applied. Intradermal testing of the highest nonreacting scratch-test dilution can then be applied for further confirmation of the lack of sensitivity. Occasionally, mild systemic reactions occur despite a negative skin reaction. The antigen in such cases is probably a metabolite not identified by the testing procedure. Heterologous serum and allergenic extracts always should be so tested before administration. It is seldom feasible to predict drug hypersensitivity by skin testing. Such procedures should be discouraged as routine techniques. Patients receiving allergic-extract hyposensitization should be observed for a period not less than fifteen minutes after injection of the allergen for evidence of systemic symptoms. A local reaction greater than 2 cm. requires that the patient

be detained with appropriate treatment given, and observed until improvement is evident.

Serologic tests have not been of reproducible value for predicting those who will experience an anaphylactic reaction. The basophilic degranulation technic has failed to give uniform results and unfortunately is not reproducible. Passive-transfer studies using the Prausnitz-Küstner reaction with human volunteers may be of value.

Intravenously infused dyes should be administered cautiously. Prior skin testing followed by an intravenous test dose has helped detect the highly sensitive patient. Prophylactic intravenous administration of antihistaminics has been of value in reducing the number of reactions.

The recognized efficiency of penicillin therapy requires comment pertinent to the prediction of penicillin reactions. When a clear example of reaction is obtained cephalothin is a suitable substitute for penicillin therapy. However, this agent should be administered only after careful skin testing. Preferably, it should not be given intravenously to patients highly sensitive to penicillin. Those with a questionable history of penicillin hypersensitivity should be skin tested with penicilloyl polylysine (major determinant group) and benzylpenicillin (minor determinants) before administration. Rarely do patients with negative reactions to either of these antigens have serious anaphylactic sequelae. Concomitant steroid therapy in an effort to suppress the anaphylactic symptoms has not been uniformly successful and may further complicate the clinical course. Penicillinase (Neutrapen) has failed to reduce reactivity appreciably. Thus, there seems little justification for the use of penicillin in the treatment of persons previously experiencing anaphylactic reactions after penicillin administration or a significant wheal-and-flare skin-test reaction to penicillin antigens. Desensitization to penicillin is undertaken with appreciable risk to the patient. Only when the clinical condition dictates use of penicillin therapy for a penicillin-sensitive patient should desensitization be instituted. Such therapy requires expert supervision by those thoroughly cognizant of its attendant risks.

Hyposensitization with hymenoptera antigenic extracts has provided relief for those who have experienced reactions to stings from bees, wasps, yellow jackets and hornets. Such patients should be advised to carry a kit containing medications for administration in the event of an acute reaction.

## Treatment

Early recognition of an adverse drug reaction is mandatory. Fatal reactions may supervene in the presence of optimal treatment. Usually, the longer the interval between administration of the drug and the onset of symptoms, the milder the reaction. Constant attention should be paid to maintenance of a patent *airway* and normal *blood-pressure* level. Mild symptoms such as pruritus and urticaria can be controlled with epinephrine, 1:1000, 0.5 ml. administered subcutaneously.

Acute anaphylactic shock requires immediate epinephrine hydrochloride (1:1000), 0.5 ml. given subcutaneously into the uninvolved extremity, repeated in five minutes if necessary. The rate of antigen absorption is reduced by the prompt application of a tourniquet proximal to the reaction area and the injection of epinephrine (0.2 ml.) directly into the reaction site. In the uninvolved arm an intravenous

infusion provides ready administration for aminophylline (500 mg.) and hydrocortisone succinate (100 mg.) to enhance resolution of bronchial obstruction. Although antihistamines are of little value once the anaphylactic reaction occurs, diphenhydramine hydrochloride (50 mg.) administered intramuscularly may block further histamine binding. Oxygen via nasal catheter and intermittent-positive pressure breathing of isoproterenol (Isuprel), 1:200, 0.5 ml. suspended in 1.5 ml. of saline solution, combats hypoxia. The patient should be kept warm and observed closely for hypotension. Levarterenol (Levophed) bitartrate (4 ml. 0.02 percent) in 1000 ml. of dextrose solution (5 percent) can be infused separately to maintain normotension. Consideration must be given to endotracheal intubation or tracheostomy in the advent of progressive hypoxia.

(The references may be seen in the original article.)

## PSYCHIATRY AND INTERNATIONAL AFFAIRS

*Bryant Wedge, Science 157(3786): 281-285, July 21, 1967. Copyright 1967 by the American Association for the Advancement of Science.*

*Psychiatric approaches to analysis of international transactions will require professional innovation.*

Albert Einstein wrote to Sigmund Freud in 1932 that "It would be of the greatest service to us all were you to present the problem of world peace in the light of your most recent discoveries, for such a presentation might blaze the trail for new and fruitful modes of action." Freud answered that he saw "... no likelihood of our being able to suppress humanity's aggressive tendencies." This reply failed to undermine Einstein's hope that psychiatry, the profession most practically concerned with disorder and conflict within and between human individuals, might help in the management of relations among nations. That hope is still with us but continues to be disappointed. Psychiatry has failed to provide practical assistance in the management of international conflict, though such conflict has become vastly more dangerous to mankind since the time of Einstein's appeal.

The idea that "wars begin in the minds of men" and that "it is in the minds of men that the defenses of peace must be constructed" is as old as the history

of relations between organized societies. It has been restated most recently and authoritatively in the constitution of UNESCO. Why has the scientific profession most concerned with helping the individual with the troubles of his mind failed to contribute to solving the most significant problem in all human behavior? What could psychiatry contribute? How should the profession make the contribution to better management of international affairs which it is theoretically capable of making?

Albert Einstein was certainly correct when he observed that "Peace cannot be kept by force. It can only be achieved by understanding." A psychiatry of international affairs can, I think, contribute to such understanding.

### Demands of and Responses by Psychiatry

Einstein was neither the first nor the last to call on psychiatry to contribute its services to the solution of problems in international affairs, nor was Freud unusual in his willingness to respond and to assert that the discipline has something useful to say on

the subject. A number of substantial reviews have documented these claims.

Most psychiatric statements on international affairs can be classified as diagnostic, prescriptive, or inspirational; few have addressed themselves to problem-solving at the international level, either in theory or in practice.

When William Alanson White, for example, suggested that "War removes cultural repressions and allows the instincts to come to expression in full force," he was making a dynamic-diagnostic statement which is somewhat more sophisticated than the frequent statements describing national behavior as "collective psychosis" or nations as "paranoid." When Harry Stack Sullivan, one of the few psychiatrists who attempted to cope with the realities of international life on an operational level, called for a "cultural revolution to end war," he spoke more thoughtfully than the recommendation that "universal love must be encouraged from childhood."

Inspirational statements have come in waves: after World War I, in the years before and after World War II, and again in the early 1960's. The last wave was apparently released by the thaw in the Cold War and growing awareness of the risk of nuclear annihilation. In 1935, 339 psychiatrists from 30 nations signed a manifesto on war prevention, declaring that "we psychiatrists declare that our science is sufficiently advanced for us to distinguish between real, pretended, and unconscious motives, even in statesmen." In 1941 George H. Stevenson's presidential address to the American Psychiatric Association claimed that "we as psychiatrists are able to evaluate (psychopathological factors constantly determining toward war) more adequately than other groups." Repeated calls to the psychiatric profession from its leaders have inspired individual psychiatrists to apply their talents to the problem and have resulted in establishing various committees and associations concerned with the issues, but in no case, to the present time, has any psychiatrist been able to sustain a professional role in the field.

The year 1963 was a vintage year; over a hundred psychiatrists gave papers, and many more participated in symposia, at the American Psychiatric Association, the American Orthopsychiatric Association, the American Psychological Association, and the American Association for the Advancement of Science. Many of these were thoughtful indeed; a number were based on substantive study of actual problems; some came to the attention of distinguished statesmen such as Senator Fulbright and Vice Presi-

dent Humphrey. But almost none of the participants has continued this interest in any professional way; one by one each has reverted to more ordinary professional work; except for brief periods such as a summer working group, none has been able, despite many attempts, to gain financial or institutional support for his efforts.

The story is the same on the organizational level. The Committee on International Relations of the American Psychiatric Association has yielded to the Committee on Transcultural Psychiatry; the brave beginnings of the World Federation for Mental Health in 1948 have been reduced to exchanges of psychiatric experience; the Committee on International Relations of the Group for Advancement of Psychiatry has not been able to realize the vision of its own 1950 report. Even the much broader UNESCO "Tensions Project" quietly folded.

This plausible idea, now over 50 years old, is actually in decline. There have been virtually no identifiable contributions to definitive policy problems; there is no institutionalized course of training or professional position in which to "practice." Perhaps it is time to examine some of the problems and some of the requirements which would be necessary for its realization.

#### Problems of a Psychiatry of International Affairs

The principals in the international system are the national states, and a true psychiatry of international affairs would be concerned with the transactions among these. This discussion will be confined to that level. Meanwhile, it is useful to note certain contributions of psychiatry which have some indirect bearing on international relations. Conventional psychiatry does provide professional services in a number of national and international organizations—services in the selection, training, and treatment of national and international public servants. Conventional psychiatric consultation is sometimes provided to national agencies in the assessment of personalities of leaders and the consequences for national policy processes. Some research and consultation has been held concerning group processes in international conferences and negotiation.

International psychiatry is even more narrowly restricted with respect to the problems of international affairs. In general, the international applications of psychiatry involve the communication of theory and techniques from one society to another with due attention to cultural differences. In short, international psychiatry represents a technical and



scientific monoculture adapted to mental health problems in differing national settings. There is no doubt that the building of international intellectual and technical ties contributes to the moderation of national behavior but in this respect psychiatry acts no differently than, say, international chemistry.

The indirect contributions of psychiatry are more significant than the direct work of psychiatrists. Social psychologists, political scientists, and development economists have drawn on psychiatric ideas in developing and testing hypotheses. Furthermore, it is possible that some of the larger generalizations of psychiatric theorists—for example, that dehumanization of the “enemy” may have profound consequences for self-image and for making behavioral judgments—have had some effect on the attitudes with which foreign relationships are approached in the policy community.

These represent the contributions of psychiatry to date; they can hardly be characterized as inputs to a “policy science” which Harold Lasswell believes possible. Before considering what these contributions might be, let us examine why psychiatry has contributed so little of consequence to problems of international affairs.

*Level-of-analysis problem.* Scholars of international affairs agree that the areas relevant to their subject are those of the international system itself, with the national states as participants. It is clear that no simple model, whether based on considerations of power, personality, economic factors, or ideological preferences can describe the transactions within the international system. The political systems of national states determine their responses to changing circumstances in the international system.

When I speak of the political systems of nations, I mean a system of assumptions concerning the domestic and international exercise of the authority process. Such a system is the product of the unique history and circumstances of the people and of the nation as an entity and includes the whole range of belief, value, habits of communication, economic activity, government forms and practices, and customary expectations which bind a people together into a nation. This is not to deny the significance of individual leaders, of the international environment, of culture diffusion, or of systemic revolution as factors in the behavior of states in the international system; it is only to assert that all these elements interact with the purposeful behavior of the separate political systems.

Psychiatry is primarily concerned with individual human beings. Only recently has the revolutionary

concept of social interdependence led psychiatry to broader concerns, those of the community and the nation as these bear on the history of individuals. The orthodox limits of psychiatry do little to prepare the profession for the scientific consideration of international affairs.

Psychiatrists who become concerned with the international world quite correctly perceive that dynamic psychological factors are somehow operative in it. Here, however, the scale of the problem is baffling and most contributors on these matters have deserted their profession's own standards of evidence and resorted to analogical thinking, often quite crude in quality; they equate the behavior of states with that of the persons or groups with which they are familiar. Here, psychiatrists often make fools of themselves from the standpoint of the decision-makers who deal with different kinds of reality. It is only the rare psychiatrist who persists in the face of these difficulties and becomes empirically sophisticated in dealing with the realities of political systems.

*Cultural problem.* Psychiatry, which has grown out of medical and biological science, is only gradually outgrowing its own history. It has been forced to do so by its own mission of meliorating the life-difficulties of its primary object, the human individual. Gradually, we have come to learn that man is an exquisitely social being as well as an intelligent animal. We are learning how very deeply the social history of an individual enters into his psychological fabric and how intimately his social circumstances affect his well-being. We are learning that, to realize our mission, we must sometimes intervene at the social level.

Meanwhile, to a certain extent, psychiatry has avoided acknowledging the fact that people of different cultures may be “just as different on the inside.” So long as patients are approached one at a time it is possible to maintain the view that persons are sufficiently alike in basic psychological quality to make unnecessary a close consideration of the culture which the individual has assimilated and in which he transacts his living.

Since a fundamental requirement for the analysis of national behavior in the international system requires a deep appreciation of culture differences and techniques for their identification, psychiatry is in this respect ill-equipped to deal with problems in the field of international affairs.

*Operant factor problem.* The realities which affect national and international decision-making include a host of issues peculiar to the political systems. These include strategic balances, economic resource-

allocation, treaty obligations, international legal considerations and domestic political questions. And the decision processes are quite different at these levels than they are on the level of individuals or small groups. For example, appreciation of fundamental differences between national and household economic planning is important to an understanding of economic stabilization.

Always, history is of profound significance, a point which I emphasize because psychiatrists, who would not think of diagnosing an individual without his history, have frequently neglected the historic realities of and between nations in their diagnostic and prescriptive essays in the field of international affairs.

The dynamics of physiology and of the flow and channeling of affect and action within the individual human mind are quite different from those which motivate the political-economic-social systems of nations: Within a social system the latter can be taken for granted or ignored for the purposes of treatment; *between* national systems they are critical. Unless these factors are taken into account, there is little chance of contributing to realistic assessments of international relations.

Through all these systems, of course, flow unique patterns of the perception of reality and action tendency which characterize any given culture. No one, except extreme advocates of power-political or economic determinism theories, seriously questions that national decisions are always and above all psychological. All of the decision-making roles in national and international political structures are filled by individuals who must rationalize and communicate their policies to constituents and counterparts in other countries. However massive and impersonal are the systems within which man lives, the human voice and human transactions play very substantial parts which must be analyzed and taken into account if their behavior is to be understood.

*Problem of disciplinary orthodoxy.* All true professions define their boundaries and discipline members who seek to transcend these. This is quite necessary to the maintenance of professional order and standards. The psychiatric profession has been savage in its treatment of members who show serious interest in international affairs. Such psychiatrists are often accused of grandiosity or immaturity. It appears that international affairs seem both abstract and oversize from the profession's usual vantage point.

Other scholarly disciplines also resist the entry of psychiatry into their fields of competence. This may

be due to the psychiatrist's limited background in another field such as political science. When he recognizes these limitations and seeks guidance in other fields, he is often warmly received and eventually consulted by scholars in contiguous fields.

In the realm of policy consideration and execution the reception is somewhat different. Only one question is really asked, "Does this man have the goods?" In no case that I know of has any psychiatrist or other scholar lacked a hearing if he brought well-based considerations to bear on a problem of concern to the policy community, especially when the evidence is couched in language that makes sense. Statesmen constantly seek to enlarge their understanding of policy-relevant factors but have no time to waste with what they regard as pretentious intellectual exercises. Having worked with a number of statesmen and bureaucrats on questions of substance, I have come to appreciate the dim view they take of a number of prescriptions thrust at them from our profession. If these prescriptions are operationally meaningless they get no attention.

Here, I must mention some of the practical problems of professional psychiatric approaches to international affairs. There is no institutional base that encourages, or even allows, serious professional work. There are as yet no university chairs in the field. The best bet for a psychiatrist seriously interested in these matters is to attach himself to some other department in a university or institute. The economic circumstances of the profession are also nearly prohibitive; it is nearly impossible to earn income close to normal professional expectations, especially at the beginning. Yet serious work in the field demands full professional attention. We are priced out of the market.

Finally, the *role* of the psychiatrist in his normal professional life has ill-prepared him for his role as consultant or investigator in international affairs. The psychiatrist is used to having the ultimate findings and final decision left to his judgment, even when he works with a team. Nothing like this pertains in his work on international affairs; here his findings and recommendations are certain to be marginal at best; if he contributes 5 percent of the rationale for any substantial decision he will be doing well and must rest content. The psychiatrist who wants to be a decision-maker in these matters is simply in the wrong profession.

## The Argument for a Psychiatry of International Affairs

Despite all these problems, there is a substantial case for applying psychiatric methods to international affairs. Clinical psychiatry involves the professional application of complex multivariate analysis and decision-making in areas of profound human relationships and in terms of incomplete and inexact information. This represents an approach more akin to the actual problems of international affairs than almost any other profession. We have learned to approach such decisions systematically and realistically; we have learned to exercise objectivity and compassion with respect to human actions, and these qualities are desirable in the analysis of international problems. At our best, we tolerate considerable ambiguity but try to reduce it to the minimum.

Psychiatry characteristically relies on many other professions for measurements, from biochemistry to sociology, and such collaboration is very useful in international affairs analysis which must also deal with many special factors from economics to weapons technology. Orderly habits and procedures for diagnosis, prescription, and correction of analysis are apt to the policy process.

More specifically, psychiatry works with behavioral propositions which are highly relevant to international affairs; we even possess some experience with explanations for behavior which might provide models sharper than those now being used as a basis for decisions. Our work with genetic-historic hypotheses, especially, might be useful in predicting behavior if we should develop them as required.

At its best, psychiatry possesses a specific set of skills and attitudes which are professionally highly developed and which are directly applicable to behavior problems in international relations. These are the skills needed to understand other persons, especially those who are alienated from our society, in their own terms. It is not a source of confusion among psychiatrists that there are many worlds, not merely one, to paraphrase Walter Lippmann. It is not surprising to psychiatrists that differences in outlook divide the human race, a circumstance which George Kennan has characterized as the source of tragedy in international life. It is just because of this skill and this experience, polished over generations, that psychiatry may have something of real value to offer in the field of international affairs because this specific competence is often lacking in the training and experience of statesmen. Indeed, in this respect no other profession or discipline is so well prepared by every day practice.

## Training Requirements

For psychiatry to live up to its claims it would be necessary to support at least a few of its members in training for quite specialized purposes, to provide and support recognized positions and, above all, to approach the complex issues of international policy with humility. I have suggested that international affairs involve levels of system-analysis, factors of history and culture, and structural and dynamic factors with which psychiatry is relatively unfamiliar and which the psychiatrist of international affairs must learn to take into account, even if he confines himself to questions of social and psychological dynamics. Consequently, the training would require education substantially beyond the normal limits of psychiatry.

Such training should include gaining a reasonable level of theoretical and practical knowledge of international affairs, both as an intellectual discipline and in terms of practical operations. In addition to psychiatric training, there should be study of government politics, economic and cultural structures, national growth patterns, linguistics, and the analysis of social-psychological phenomena.

I am aware that I have outlined a curriculum which would require 3 to 5 years of study to acquire minimal competence and which goes far beyond the field of psychiatry. Indeed the only possible places to gain sophistication in these subjects are the universities and international affairs schools where study can be undertaken with appropriate departments—those of anthropology, history, political sociology, economics, and international relations. How could a psychiatrist, already extensively trained and economically privileged, be expected to undertake such a course of training? It is clear that he must if he is to be competent in matters of international affairs.

Five years of post-residency training, when coupled with research and the development of specialized capabilities, is not unusual for the psychiatric specialist, whether he works in psychoanalysis or community organization. I suggest that federal and other special grants might be obtained to subsidize such training. If we were to assume that this had been accomplished, let me visualize the course of career development.

Ideally, the psychiatrist should be experienced and mature as a professional in his field before entering such a specialty; in short, he should have had 4 or 5 years of psychotherapeutic and community practice. At this point he might enter a department of psychiatry or an institute for specialized training and



experience. He would then pursue study outlined above, perhaps contributing something from his own professional background to the teaching program—I have indicated that several of these fields have some interest in psychiatric theory although they lack professional competence; my personal experience has been that substantial consultation is sought by scholars in relevant fields.

Meanwhile, it would be possible to supplement theoretical training by practical field experience; 2 or 3 months of case study each year, whether in the field or from documents, could be devoted to analysis of appropriate problems. Such case studies could provide the student with practical experience in dealing with the policy community. From such study and such experience, it is certain that—if the claims of psychiatry have been correct and it does have something to offer—specialized professional roles would develop.

I will not be too specific in outlining the precise roles which could be developed for a psychiatry of international affairs; this question is open to experimentation. But it is clear that these would involve analyses and predictions of behavioral response in international transactions. In matters of communication, the analysis would include questions of "What does the other fellow really mean to convey?" or "How can I make him understand me?" and "How can I keep my role defined while I communicate with him?" These are questions which are obviously involved in any psychiatric dialogue and they are critical to the conduct of international affairs.

Some psychiatrists would certainly conduct their work as teachers and researchers in universities; some would go into government service where there is a serious shortage of specialists in the behavioral sciences; others would become consultants in diplomatic problem-solving. The role would be technical, one of providing analysis of problems and of carrying out such studies and making recommendations. Never, in my view, could a psychiatrist enter into

the decision process in any direct way without abandoning his proper professional role.

While the kind of program outlined here may sound visionary and almost impossibly extended in time and resource, the outcome might provide sufficient justification. By the age of 35, the psychiatric specialist in this field could be fully trained, experienced, and prepared to contribute to a most critical enterprise, that of building a viable international order.

#### Potential Contributions of a Psychiatry of International Affairs

It is as yet impossible to visualize all of the possibilities for a psychiatry of international affairs. They range over the whole spectrum of human communication and social behavior. At a practical level, psychiatry could contribute to more accurate conduct of international affairs. My own work has involved studies of the personality characteristics of foreign leaders, of psychopolitical factors in specific international conflicts, of interpretation of negotiating behavior, of improving effectiveness of communication among nations, of analyzing psychological aspects of policy—as these might modify cost-effectiveness or strategic decisions—and of working out means to establish human contact with groups isolated from and essentially wrong-headed about the United States. I am satisfied that in each of these case studies something unique has been systematically derived from the psychiatric discipline—concepts, attitudes, and modes of analysis which are peculiar to our profession and nowhere else so well developed.

The ultimate contribution of a psychiatry of international affairs could well be conceptual and theoretical. Working by the case method and basing generalizations on hard evidence, we may be able to construct a new and deeper understanding of the political processes within which we all live.

(The references may be seen in the original article.)

## A RARE CASE OF CHRONIC LEAD POISONING: POLYNEUROPATHY TRACED TO LEAD SHOT IN THE APPENDIX

*Francis E. Hillman MD, Industr Med Surg 36(7):488-492, July 1967.*

Lead poisoning is seldom encountered in adults not engaged in the lead trades. Moreover, while it is unusual to find foreign bodies of any kind in the appendix, the discovery of lead pellets is indeed rare. Such a finding combined with neurologic symptoms seems to be entirely unprecedented. Nevertheless, other cases of accidental lead poisoning have been reported in which the cause of intoxication was exceedingly elusive. An obscure clue in the patient's history may be more important than the most sophisticated technics of investigation. In the present case, a routine diagnostic procedure finally brought to light the unsuspected source of lead absorption.

### Case History

A 48-year-old, childless woman visiting in Los Angeles was first seen in our office in July, 1965. She reported that in March, 1964, she had noticed weakness in her hands, particularly in the left thumb and index finger. In a week or two, all fingers were affected, so that she could no longer carry on her work as a waitress. A neurologist had prescribed vitamin therapy and braces, worn at night, to reduce contractures. Slight improvement had been noted, but during the past 15 months progress had been very slow. The relatives with whom she was visiting had insisted on a consultation.

The patient seemed to be in good general health. Some wasting of muscles in the web of the thumb and in the scapular region was evident, with characteristics of a "clawhand," particularly on the left. Patient reported having had no serious diseases nor operations other than tonsillectomy and no previous roentgen studies. Since neither the clinical findings nor the history permitted a satisfactory diagnosis, a roentgenographic as well as a laboratory work-up were ordered.

A preliminary film of the abdomen showed multiple spherical radiodensities (3-5 mm in diameter)

over the right lower quadrant. The shadows, of an almost metallic density, lay in a curvilinear position, suggesting localization in the appendix. On the following day, a barium study of the entire colon confirmed the presence of bead-like, metallic densities in the appendix, similar to BB shot. No abnormalities were noted in the rest of the gastrointestinal tract, nor in the chest, gallbladder, or urinary system.

Vaginal and urinary findings were normal. Blood studies showed low borderline anemia, with very low hematocrit, increased leukocytes, and elevated sedimentation rate. All other findings were within normal limits.

Upon interrogation, patient confirmed that she frequently ate wild game and birds, stating that her husband hunted with a shotgun almost every week. Appendectomy was recommended.

### Past History

The physicians who had previously treated this patient concurred with the tentative diagnosis and the recommendation of appendectomy. Their office records were made available to complete the patient's history. For some years, she had been treated for iron-deficiency anemia. Upon the first appearance of muscular disability, her general physician referred her to an orthopedist. Suspecting amyotrophic lateral sclerosis, he in turn referred her to a neurologist.

The first neurologic examination (April, 1964) revealed bilateral weakness of the facial musculature, with loss of strength in the 11th nerve on the left side; alternate motion rate (AMR) of the tongue was 35 percent. Upper and lower extremities showed bilateral muscle weakness (greater on the left than the right and more peripherally than centrally), with reduced AMR. Atrophy was noted in both hands and around the shoulder girdle. The biceps reflex was reduced, but all other reflexes were brisk and overactive. Sensory examination produced essentially normal responses in trunk and face, but showed some reduction in discrimination and response to pain and

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light touch in the upper and lower extremities. All other findings were within normal limits.

Patient was hospitalized for further studies, including complete blood count with red cell indices, blood sugar determination, thyroid evaluation, lumbar puncture, and electromyographic survey. None of these tests pointed to a specific entity. The impression was diffuse spinal cord disease with peripheral nerve involvement, not excluding the possibility of other forms of spinal cord degeneration. Treatment consisted of vitamin B-12 injections and vitamin B-complex by mouth. Contracture-reducing braces were prescribed.

Within the first six weeks, some improvement was noted. Muscles gradually regained strength, especially in the face and neck. She was able to work on a limited basis and to take care of her home. Tingling in fingers and hands developed, probably due to partial return of sensation. High doses of vitamins were prescribed throughout the next year, and slight improvement continued. Although adequate strength in upper arms, shoulders, and legs returned, the intrinsic muscles of the hands remained weak. Light physical therapy was started, emphasizing opposition of thumb and little finger on both hands as well as adduction and abduction of all fingers.

The apparent regeneration in the nervous system, particularly without other evidence of progress in the disease, seemed to confirm the tentative diagnosis of polyneuritis.

#### Operative Findings

Preoperative roentgenograms made in January, 1966, revealed that metallic foreign bodies were still present in the lumen of the appendix. Except for slight anemia, laboratory findings were within normal limits. Appendectomy was performed on January 15, 1966. The appendix, in a retrocecal position, was extremely tortuous, with its middle portion fixed to the lateral pelvic gutter. From this kinked area to its distal end, the appendix was free-floating. It contained easily palpable foreign bodies in the distal two inches, not fixed to the wall of the appendix.

The pathologic specimen measured 14 cm in length and approximately 8 mm in diameter. In addition to a dozen or more pellets—averaging 2½ mm in diameter—the appendix contained multiple tiny grains of material, some apparently metallic. Microscopic examination of the wall of the appendix did not demonstrate active inflammation. A semi-quantitative spectrographic analysis showed the pel-

lets to consist mainly of lead (98.4 percent), the remainder made of antimony (1.2 percent) and traces of other metals.

On the third postoperative day the muscles of both arms were evaluated. There was no response to faradic stimulation, and the muscles reacted sluggishly to galvanic current. The range of voluntary motion was normal in all muscle groups supplied by the musculocutaneous and radial nerves. Some muscle groups supplied by the median nerve were affected. The ulnar nerve showed the greatest involvement, with impairment of voluntary motion both more extensive and more pronounced on the left.

New braces were constructed which permitted use of the thumb by compensating for the lack of opposition. These could be worn at work. Physical therapy to reeducate the other muscles was prescribed.

Progress continued over the next year. Muscular strength increased greatly, and the patient's ability to grasp and hold objects returned almost to normal. She has been able to carry on a full six-day-a-week work schedule.

#### Discussion

Lead shot lodged in the appendix is a rare finding in this country. A review of the pathologic reports on 71,000 surgical and postmortem specimens of the vermiform appendix revealed only 147 instances of lead shot, a rate of 0.21 percent. The incidence is considerably different in Middle Europe, where shotgun pellets are frequently found in the appendix. In regions where small game is regularly sold on the market, lead shot is the foreign body most often found in the appendix. In Great Britain, too, lead pellets in the appendix are not uncommon.

In Siberia, the frequency of lead shot in the appendix led to a roentgenographic survey of 22 subjects from the Arctic region. In five women (aged 14 to 40 years) an accumulation of round-shaped bodies (diameter 3-5 mm) was demonstrated on the right side of the abdomen. None of these subjects presented symptoms of lead poisoning, but two, who complained of continuous dull pain in the area of the appendix, were operated on. In one case, the appendix contained seven pieces of shot, 75 in the other.

Pain in the right side of the abdomen is the usual symptom leading to roentgenographic detection of lead shot in the appendix. Sometimes, however, these foreign bodies have been accidentally discovered during roentgen studies made for other reasons. Inflammation of the appendix has been known to



abate and start healing in spite of the presence of lead shot. In all these cases, a history of ingestion of small game or wild fowl was elicited postoperatively.

More than 200 years ago Hevin reported that shot could be retained in the appendix without giving rise to symptoms: "One notices sometimes in opening the bodies of persons who, during life, have eaten a great deal of game that there is collected in the intestines, and especially in the caecal appendix, a great quantity of shot, without those persons having had the least inconvenience." Perhaps the strangest case is the one in which a .22-caliber bullet was found in the appendix, although the patient, an Indian trapper, denied ever having received a gunshot wound or having eaten any game shot with a rifle.

Most ingested foreign bodies pass through the gastrointestinal tract and are eliminated with the feces. A particularly heavy body such as lead shot, however, is likely to drop by its own weight from the semiliquid contents of the cecum into the orifice of the appendix. As long as it remains in the antrum, peristaltic contractions may again propel it back into the fecal stream to be evacuated. Occasionally, a foreign body is demonstrated in the roentgenogram, and we find upon appendectomy that it has been expelled in the interim. This is much less probable when the foreign body has lodged in the middle or lower third of the appendix, especially if it has been forced beyond a kink or angulation produced by adhesions, as in the present case.

#### Toxic Effects of Ingested Lead

An exhaustive search of the literature has produced no other case in which toxic reactions were noted following the ingestion of lead by a human being. In wild fowl, on the other hand, not only have neurologic changes been noted, but swallowing lead shot scattered throughout their feeding grounds frequently causes fatalities. However, lead absorption has occurred in humans from shot or bullets lodged in the tissues. In such cases, the lead may have been carried for years before giving rise to neuromuscular symptoms.

Apparently, no great danger of lead absorption exists so long as the projectile remains covered by connective tissue. Nevertheless, lead is known to dissolve readily in biologic fluids, and this may be a factor in cases of delayed plumbism. In reporting such a case, Reitano suggested that lead was absorbed into the circulation only after the bullet emerged from the bone into the articular cavity. Von Hagen emphasized that abrasion in joint spaces pro-

motes diffusion through the tissues and facilitates absorption.

Sollman's conclusions are related more directly to our case. He stated that lead retained indefinitely in the gizzards of wild fowl is particularly virulent because of the slow grinding and maceration of the pellets. This closely parallels the process of disintegration of the lead in the appendix and probably accounts for the singularly toxic effects in our patient. The shot had undoubtedly been accumulating for years, as evidenced by the long-standing anemia and the pathologist's report of "multiple tiny granular material, some metallic," in addition to many intact lead pellets.

Abnormal lead absorption results most consistently in harmful effects to the blood cells. Specifically, interference with hemoglobin synthesis is held responsible for the anemia connected with plumbism. Women may have a greater sensitivity to lead because of their lower hemoglobin level. Lead anemia, however, is not usually severe because of an accompanying stimulation of bone marrow activity. Since slight anemia may be secondary to a variety of conditions, it would not immediately suggest lead poisoning, especially in a person not associated with the lead trades.

#### Neuromuscular Symptoms

Without the occupational clue, tracing neurologic disorders to lead poisoning is difficult. In the present case, the signs of polyneuritis were particularly baffling. Typically, weakness of the extensor muscles (supplied by the radial nerve) results in "wrist-drop"—one of the first manifestations of lead poisoning. An analogous "wing-drop" has been observed in wild fowl poisoned by ingesting lead pellets with their food. Histologic investigation in dogs has definitely pinpointed radial nerve degeneration as the main target in lead-induced tetraplegia; the ulnar nerve was involved to a lesser extent and the median nerve minimally. Biochemical data collected in the same study showed disturbance in content and distribution of amino acids in peripheral nerves, especially the radial nerve.

Unaccountably, our patient presented the characteristics of a clawhand, implicating a lesion of the ulnar nerve, and the postoperative muscle evaluation confirmed that the ulnar nerve was affected rather than the radial nerve. Bramwell's observations show that he, too, was considerably puzzled about the "selective action of poisons."

The first symptoms—her clawhand, together with the characteristic involvement of neck, face, and

tongue—suggested amyotrophic lateral sclerosis. Other investigators have pointed out that the clinical picture of lead myelopathy is occasionally indistinguishable from amyotrophic lateral sclerosis. Since lead neuropathy involves the myelin sheaths of the motor nerves, it is not surprising that the symptoms sometimes closely simulate those of disseminated sclerosis. However, the fact that the disease in this case had not advanced argued against such a diagnosis. At the same time, the patient's slow progress and the incomplete results from intensive vitamin therapy suggested that the cause was other than a metabolic imbalance.

In the face of these contradictory features, a careful clinical reevaluation of the patient's condition was indicated when I first saw her. Over the years, I have made it a rule to perform a roentgen study as part of the general work-up, particularly in persons over 40 years of age—and certainly when confronted with an equivocal diagnosis. In this case, the presence of lead was discovered immediately upon viewing the roentgen films. Only then was it possible to fill in the missing data in the patient's history—that, because of her husband's hobby, her diet regularly included wild game and birds. If this link had been uncovered sooner and the presence of lead confirmed

at once, no doubt further laboratory tests would have been performed to establish a definitive diagnosis of lead poisoning.

However, the retrospective diagnosis can hardly be questioned. It is extremely unlikely that slow disintegration of lead could have been going on for so long without some absorption. It is even more improbable that ideopathic polyneuropathy would have developed independently over the same period.

#### Summary

Muscular paralysis, wasting and especially a claw-hand, were first attributed to amyotrophic lateral sclerosis or polyneuritis of unknown origin. Later, a roentgen study demonstrated lead shot in the appendix. Finding of fragmented pellets at appendectomy indicated lead absorption as the cause of the neuromuscular symptoms. No previous case of this kind seems to have been reported.

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(The omitted figures and references may be seen in the original article.)

## MEDICAL ABSTRACTS

### PROGNOSTIC SIGNIFICANCE OF CANCER CELLS IN THE CIRCULATING BLOOD— A TEN YEAR EVALUATION

*S. S. Roberts MD, J. W. Hengesh MD, R. G. McGrath BS, J. Valaitis MD, E. A. McGrew MD, and W. H. Cole MD, Amer J Surg 113 (6): 756-761, June 1967.*

Seven percent of 767 patients with cancer studied more than five and as many as ten years ago had positive blood samples. A similar frequency of positive blood samples was obtained when only those patients considered "curable" were tabulated, or those patients studied before, during, and after operation. The survival rate in the entire group of 767 patients was not different with regard to positive or negative blood samples, being 13 and 12 percent, respectively. The survival rate for "curable" patients with positive blood samples was no different from the survival rate for those with negative blood samples; it was 32 percent for each category.

Although there is no apparent difference in the five to ten year survival rates of all 767 cancer patients, regardless of whether the blood samples are positive

or negative, a definite trend is apparent in the decreased survival of patients with a shower of circulating cancer cells during or after operation. Only two of twenty-three patients (8 percent) with showers of cancer cells demonstrated during operation were alive and well five to ten years postoperatively as compared with a 16 percent survival (26 of 182) of patients with negative blood samples at all times before, during, and after operation. Also vascular metastases developed in 39 percent of those patients with showers of circulating cancer cells during operation as compared with only 18 percent of those patients with all negative samples.

### LONG-TERM FOLLOW-UP STUDY OF PERIARTERITIS NODOSA

*Peter P. Frohnert MD and Sheldon G. Sheps MD, Amer J Med 43(1): 8-14, July 1967.*

The records of 130 patients with histologically proved periarteritis nodosa seen at the Mayo Clinic from 1946 through 1962 were reviewed. Intensive corticosteroid or ACTH therapy had been given to 110 of these patients. The expected survivorship,

calculated by the life-table method, revealed a five year survival of 48 percent for the treated patients and 13 percent for the untreated ones. The presence of hypertension or renal disease at the initial examination seemed to worsen the prognosis. Both disorders were less frequent in patients who had received steroid therapy early in the course of their disease. Subdivision, on clinical grounds, into those with and without pulmonary involvement appeared to have no value in regard to the prognosis. Early and vigorous steroid therapy was of significant value in improving the results in patients with periarteritis nodosa. The majority of patients had to continue this treatment on a long-term basis to suppress symptoms or to prevent exacerbations. Side effects were infrequent.

### THE MEDICAL SEQUELAE OF NARCOTIC ADDICTION

*Charles E. Cherubin MD, Ann Intern  
Med 67 (1): 23-33, July 1967.*

The disease states associated with addiction to narcotics are reviewed. There is a decidedly increased mortality among addicts. Since the size of the addict population is not clearly known, the true extent of the increase is also unclear. The principal cause of death appears to be sudden collapse with pulmonary edema after intravenous injection.

Other conditions associated with narcotic usage are tetanus, septicemia, tuberculosis, hepatitis, an

unknown type of chronic liver disease, endocarditis, skin abscesses, thrombophlebitis, pulmonary embolism, pulmonary hypertension due to foreign body granuloma, and complications of pregnancy. No longer seen is the malaria that was at one time the most widely recognized addiction-associated disease state.

The significance of these disease states for large-scale addiction rehabilitation program planning is immediate and obvious. These programs when fully realized should provide a medical screening and continuous medical supervision. The significance for the individual physician is also stressed. The gaps in our knowledge are indicated, and the need for further investigation of important causes of addict morbidity and mortality is stressed.

### ACALCULOUS CHOLECYSTITIS

*Andrew M. Munster MB BS FRCS, James  
R. Brown MD, Amer J Surg 113(6): 730-734,  
June 1967.*

Twelve cases of acalculous cholecystitis are reviewed by the authors and the pathologic condition discussed. Preoperative diagnosis is difficult to make. The increased morbidity associated with cholecystectomy in patients with acalculous disease makes mandatory a search for associated disease, a classification of which is offered.

## SUBMARINE MEDICINE SECTION

### CHANGES IN TOP SUBMARINE MEDICINE POSTS

On 30 June 1967, CAPT John H. Schulte, MC USN, retired after twenty-two years of naval service and relinquished his post as Director, Submarine and Radiation Medicine Division, Bureau of Medicine and Surgery, to CDR Ben K. Hastings, MC USN. CAPT Schulte and his family will reside in Columbus, Ohio, where he has accepted a position as Professor of Occupational Medicine at Ohio State University.

CDR Hastings has been serving as Force Medical Officer on the staff of Commander Submarine Force Pacific Fleet since 1964. He completed his sub-

marine and diving medicine training in 1952 and has since served in numerous operational and staff billets as a submarine and diving medical officer. Dr. Hastings is a graduate of the Reed College Course in Radiobiology, the Armed Forces Special Defense Course, and the reactor engineers training course at a nuclear power training unit. He has been relieved as Force Medical Officer, COMSUBPAC, by CDR Richard T. Arnest, MC USN.

August 1, 1967, saw CAPT James E. Stark, MC USN, leave his post as Force Medical Officer on the staff of Commander, Submarine Force Atlantic Fleet where he has served since 1963. Upon arrival in Washington, D.C., he will assume his new duties as



Chief, Medical Division, Defense Atomic Support Agency and DASA Surgeon. CAPT Stark has been relieved as Force Medical Officer, COMSUBLANT, by CDR John Caruso, MC USN.

CAPT Charles L. Waite, MC USN became Executive Officer of the Naval Hospital, Portsmouth, Virginia in September after relinquishing command of the Naval Submarine Medical Center, Groton, Connecticut. CAPT Waite served as Commanding Officer of the Naval Submarine Medical Center since 1964 when he reported from staff, COMSUBPAC where he was Force Medical Officer. He has been instrumental in the development and organization of the School of Submarine Medicine and has made a significant contribution to the Navy's underwater research program. CAPT Waite received his M.D. degree from Georgetown School of Medicine in 1946. He is certified by the American Board of Pediatrics.

CAPT Waite will be relieved by CAPT Gerald J. Duffner, MC USN, the present Commanding Officer of the Naval Hospital in the SANCTUARY (AH-17). CAPT Duffner is a familiar personality in the submarine medicine field having served in numerous submarine and diving medicine billets. During his tenure as Director, Submarine and Radiation Medicine Division, Bureau of Medicine and Surgery, from 1959 to 1963, CAPT Duffner participated in the inception of the nuclear submarine program and helped formulate many of the policies which today serve as guidelines in the practice of submarine medicine. CAPT Duffner completed his submarine training in 1945 and is presently certified by the American Board of Preventive Medicine.—Submarine Medicine Branch, BuMed.

## OPPORTUNITIES IN SUBMARINE MEDICINE

The Navy's underwater activities are rapidly expanding in both submarine development and diving research. During recent years, the Nuclear Submarine and "Man-In-The-Sea" programs have created many new problems concerning the ultimate physiological and psychological limitations of man living in these underwater environments. As a result of this expansion, the opportunity for special training for medical officers to provide technical support for submarine and diving personnel has increased at a rapid pace.

Medical officers accepted into the Submarine Medicine Program will attend a comprehensive six-month course of instruction covering all aspects of submarine and diving medicine at the U.S. Naval Submarine Medical Center in Groton, Connecticut. Where interests and capabilities so warrant this training can be supplemented by additional training in diving medicine at the Deep Sea Divers School, Washington, D.C.

Subsequent duties include tours aboard POLARIS Submarines, on Submarine Squadron Staffs, in operational diving assignments and in research. Post-graduate training in diving physiology, radiobiology, public health and occupational medicine are all readily available.

Classes convene at the Submarine Medical Center in January and July of each year. The next scheduled class is 22 January 1968.—Submarine Medicine Branch, BuMed.

## DENTAL SECTION

### WHAT IS THE RELATIONSHIP BETWEEN BACTERIAL PLAQUE AND CALCULUS FORMATION?

*J. Theilade, R. Lobenc, I. Mandel, and S. Hazen, J Western Society Periodontology, Periodontal Abst 15(2): 53, 56, June 1967.*

Evidence indicates that in man dental calculus is, in the main, mineralized bacterial plaque. This mineralization may start as soon as twenty-four hours after the first deposition of plaque. The finding of "calculus-like" formations occurring in germ free animals does not necessarily refute the importance of bacterial plaque in the formation of oral calculus. Bacterial involvement in calculus formation may be completely passive and dependent on chemical composition rather than physiologic activity. On the other hand, viable bacteria can produce local elevations of pH by the elaboration of urease and deaminases, increase phosphate concentrations by phosphatases, and introduce stickiness by production of levans and dextrans.

The difference in color and hardness of supra- and subgingival calculus has been explained by minor chemical and crystallographic differences in the organic component of the two types of calculus. These differences may reflect variations in the fluid which carries the inorganic salts to the mineralizing plaque which then supports the view that subgingival calculus, acquires mineral salts from the gingival exudate. If the mineralization of subgingival calculus is from gingival exudate and the exudate flow from gingival crevices diminishes in health, it may well be that subgingival calculus is a result of gingivitis rather than a primary etiologic factor.

Although a correlation between calculus and gingivitis had been established in epidemiologic studies, the correlation between plaque and gingivitis is more significant. This may be explained by at-

tributing the gingivitis producing factor to the unmineralized bacterial plaque retained on the surface of the calculus rather than to the mechanical effect on the gingiva by the calculus. "The significance of the bacterial plaque for the production of gingivitis was convincingly demonstrated in clinical experiments in man." It is therefore believed that the role of calculus in gingivitis is limited to its plaque retaining ability.

Calculus per se is a secondary irritant since the surface is actually covered with soft bacterial plaque thus negating the mechanical irritation concept of the solid interface with the soft tissue of the gingival crevice. The most damaging action from calculus then comes from keeping the primary uncalcified bacterial irritants in close contact with the gingival crevice.

A quantitative study of plaque and calculus formation in normal and periodontally involved dentitions had five times the plaque accumulation than the normal mouths, and after thirty days, these same periodontally involved mouths developed five times as much calculus. Further, no qualitative differences have been found in the microbial flora or infectivity of organisms in the two study groups. The findings strongly suggest that there is a cause and effect relationship between the number of organisms in plaque, its rate of formation and the severity of periodontal involvement.

"Although periodontal disease has a multifaceted etiology, the relative ease by which soft plaque can be eliminated from the interfaces of tooth and gingiva with the oral environment, constitutes the primary prevention of periodontal disease. Until a simpler technique is developed, effective removal of this plaque on a day-to-day basis must be the patient's modus operandi for the preservation of the health of the gingiva."

(Abstracted by: CDR Walter N. Johnson, DC USN.)

## PERSONNEL AND PROFESSIONAL NOTES

### COPIES OF ALL ORDER ENDORSEMENTS

All activities are requested to comply with the provisions of Article C5407(4), BuPers Manual to assure that reporting and detachment dates are accurate in the Dental Division. This is most necessary on all first orders to establish proper release and/or rotation dates. Copies of reporting and detachment endorsements should be sent direct to BuMed, Code 613 in addition to those required by BuPers.

### NEW CORRESPONDENCE COURSE IN DENTAL ADMINISTRATION

The Naval Dental School announces the availability of a new correspondence course, *Dental Administration*, NavPers 10736-C, which replaces an earlier course with the same title. The purpose of this course is to inform the dental officer of his military and professional duties and of the policies and practices of BuMed and the Department of the Navy as they relate to efficient organization, administration, and management of each type of naval dental facility.

The textbook is *Dental Administration*, NavPers 10483, written at the Naval Dental School and published in looseleaf form to permit regularly scheduled revisions. The current edition (consisting of changes 1, 2, and 3) is a complete revision of the original text.

This course is available to all dental officers, Regular and Reserve (active or inactive) of the Armed Forces; naval officers of the Medical Service Corps, Regular and Reserve, and Army and Air Force officers in corresponding dental service categories; ensigns 1925, Naval Reserve; Army and Air Force dental student trainees; and dentists of other Federal agencies. It is also available to dental enlisted personnel recommended by their commanding officers. Since a major revision has been made, full credit may be received by completion of the new course even though the earlier course may have been completed.

Applications for enrollment should be submitted on Form NavPers 1550/4 (or the old Form Nav-

Pers 992), with appropriate change in the "To" line, and forwarded via official channels to the Commanding Officer (Code E-43), Naval Dental School, National Naval Medical Center, Bethesda, Maryland 20014.

The new course is evaluated at 24 points, creditable only to personnel eligible to receive them under current directives governing retirement of Naval Reserve personnel. The 13 assignments are divided into 2 units, the first consisting of assignments 1 through 7 and the second of assignments 8 through 13.

### DENTAL CORPS STATISTICS

An article published in the previous issue of the *U.S. Navy Medical News Letter* related a spectacular rise in the construction of one classification of crowns from 1961 to 1967. One interpretation of this statistic was that fewer destructive and undesirable tissue-borne partial dentures, or "flippers," are being fabricated.

Moreover, an earlier article noted a major increase in the number of teeth being treated endodontically. Both of the articles attest to a more conservative approach to dental problems in the Navy. This becomes more evident when statistics relating to extractions are studied which show a downward trend during the last several years.

Present reporting procedures in the Standard Form 477 regrettably do not permit an analysis of the number of tissue borne partial dentures being fabricated. However, a forthcoming change in Man-Med, Article 6-150, will provide a means of identifying this type of a partial denture.

In consonance with the practice of present day Navy dentistry, the completely tissue borne partial denture is considered a temporary denture with extremely limited usage. Its utilization consequently should be confined strictly to temporizing situations and replacement provided for in an overall treatment plan.



## NURSE CORPS SECTION

### FOUR NURSES GRADUATE FROM HYPERBARIC COURSE

Four pioneering Navy nurses have graduated from a special course in a new field of medicine that utilizes high pressures and oxygen to treat a variety of illnesses.

On May 12, 1967, CAPT C. L. Waite, MC, Commanding Officer of the Submarine Medical Center, New London, Groton, Conn., presented diplomas to the graduating class of the first course in Hyperbaric Nursing to be held in the Armed Forces.

All graduates are from the nursing staff at the Station Hospital and include CDR Louise Bareford, NC USN; LCDR Maria A. Chisholm, NC USN; LT Patricia A. Fellenz, NC USN; and LTJG Joan C. Washburn, NC USNR.

The two-week course required the nurses to become fully knowledgeable in the medical effects of high gas pressures, the operation of recompression chambers, and the latest applications of high pressure and oxygen to treat injuries and disease. Oxygen under high pressures has been shown in recent years to be valuable in treating near-drownings, carbon monoxide poisoning (auto fumes), some cancers, and gas gangrene.

While Navy medical officers have been working in high pressure chambers for many years in treating the bends and other diving accidents, this is the first time nurses have been required to enter the chambers with the doctor to practice their art under high pressure.

The Navy's two hospital ships in Southeast Asia are equipped with high pressure treatment chambers similar to the ones used to train this group of graduates.

LT Donald T. Evans, Director of the School of Submarine Medicine, and his staff conducted the first course.—Dolphin XVII(29): 3, May 1967.

### WORKSHOP IN WARD MANAGEMENT

A one-day Workshop in Ward Management was conducted by the Nursing Service at the Naval Hospital, Oakland, California. LCDR Gladys Madsen coordinated the speakers and materials to be presented. The student participants were selected lieutenants junior grade ready to assume charge nurse responsibilities in their respective clinical areas.

The program content was geared to better prepare these young officers to assume the increased responsibilities on extremely active military and dependents wards.

The one hour periods provided time for lectures, role playing, exchange of ideas and very active discussion.

The response to this type of program was most gratifying. The written critiques showed that the majority of these people remembered very little about the functions of the corpsman, his background, and his military preparation. They also felt that the knowledge gained provided confidence and a deeper understanding of their responsibilities.—Nursing Div, BuMed.

## PREVENTIVE MEDICINE SECTION

### SIMULTANEOUS ADMINISTRATION OF LIVE MEASLES VIRUS VACCINE AND SMALLPOX VACCINE

*P.M. Sherman, R.G. Hendrickse, D. Montefiore, T. Peradze, and G. Coker, Brit Med J 2: 672-676, June 10, 1967.*

Smallpox has been virtually eradicated from Europe and America by means of efficient control

measures practiced over many years. The disease is still prevalent in large areas of Africa and Asia,

and the possibility of global eradication was discussed by an expert committee of the World Health Organization.

Measles is also a serious disease in developing countries having many clinical similarities to the illness as seen in Europe in the early part of the present century.

During the past few years methods of active immunization against measles have been developed. Much emphasis has been placed on the use of live vaccines, and there have been numerous reports on the use of the attenuated types of measles vaccines, as well as on the comparison between *attenuated* and *further attenuated* vaccine strains with regard to clinical reactions and serological response.

Satisfactory results have been reported from Senegal and Nigeria in trials of further attenuated measles vaccines administered by needleless injectors. This method of injection would be required in any large-scale vaccination program.

Plans for the eradication of smallpox and the control of measles in the near future, in 19 West African countries, "sponsored by the U.S. Government in cooperation with the World Health Organization," announced recently in the Nigerian press, bring the problem of the simultaneous use of measles and smallpox vaccines to the forefront.

Meyer *et al.* reported on the response of 545 children in the Upper Volta who were given combined measles, smallpox, and yellow fever vaccines, which were physically mixed before being used in a single injection. They gave little detailed information about the clinical responses to the procedure apart from that concerning febrile responses and rashes. Budd *et al.* (1965) evaluated measles and smallpox vaccines administered simultaneously to 258 children in Togoland; information is not available whether or not the vaccines were physically mixed. The attenuated Enders B Strain of measles vaccine was used in both trials.

The results of the trials indicated that antibody responses were good, but were accompanied by a high rate of severe febrile reactions. Similar trials have not been carried out in other West African territories, nor has there been a direct comparison between the responses to attenuated and further attenuated measles vaccine when given simultaneously with smallpox vaccine.

If developing countries are to embark on mass smallpox/measles vaccination campaigns information is urgently needed regarding the nature of reactions that are likely to follow the procedure. Information is also needed on which of the live measles

vaccines currently available are most suitable for use in such a campaign in developing African countries.

In an attempt to answer these questions a clinical trial in children was undertaken in a town in Western Nigeria. In this trial one group was given *attenuated* measles vaccine plus smallpox vaccine; a second group was given *further attenuated* measles vaccine plus smallpox vaccine; and a third group, which acted as controls, was given smallpox vaccine only. The aim was to determine the pattern of reaction to the simultaneous vaccination procedure, including antibody responses, and to discover whether there were any significant differences between reactions provoked by the attenuated or further attenuated measles vaccines when given with smallpox vaccine. The results of the trial follow.

#### Material and Methods

The study was undertaken at Ipetu Ijesha, a town of some 43,000 to 47,000 persons, situated about 97 miles from Ibadan, in the Western Provinces of Nigeria.

Healthy children between the ages of 6 months and 3 years who had had neither measles nor smallpox vaccination were invited to attend for a simultaneous measles/smallpox vaccination. The children were preregistered on unnumbered cards, the name, age, sex, and address of each child were recorded by local personnel in the week before the day of vaccination.

On the day of vaccination all the children attending were screened by experienced nursing staff, and those considered unfit for vaccination were excluded. The registration cards of those accepted into the trial were numbered serially.

The children were divided into 3 groups: (1) smallpox vaccine only; (2) smallpox vaccine plus further attenuated measles vaccine (Beckenham 31; Wellcovax), referred to as the Wellcovax group; and (3) smallpox vaccine plus attenuated measles vaccine (Enders B type; Rubeovax Lyovac), referred to as the Rubeovax group. All children in the combined smallpox plus measles groups had blood samples taken before vaccination and on the 21st day after vaccination.

#### Vaccines and Vaccination Procedure

The *smallpox vaccine* came from the Lister Institute and was supplied in ampoules containing enough material for 25 vaccinations by the multiple-pressure technique. The material in each ampoule

was reconstituted in the diluent supplied and then made up to 3 ml. with normal saline. The vaccine was administered by Dermojet, which delivers approximately 0.07 ml. per dose. The number of pock-forming units in 0.1 ml. was about 10. An average of 40 doses was obtained from each ampoule. Smallpox vaccine was given in the deltoid area of the left arm.

The *attenuated measles vaccine* used was the Enders B type vaccine (Rubeovax Lyovac). This was in single-dose ampoules which were reconstituted with 0.7 ml. of diluent supplied by the manufacturers; 0.5 ml. of the reconstituted vaccine contained a dose of 1,000 TCID and was given subcutaneously by syringe and needle into the upper outer quadrant of the buttock.

The *further attenuated measles vaccine* used was Beckenham 31 vaccine (Wellcovax), supplied in multidose containers. The vaccine was reconstituted with distilled water so that a dose of 1,000 TCID was contained in 0.2 ml. This was delivered by Ped-O-Jet needleless injector subcutaneously into the upper outer quadrant of the buttock.

#### Follow-up

1. After vaccination the registration card was taken from the patient and an appointment card bearing the same number was issued. An instruction sheet containing details of the follow-up procedure was also given to the mothers. All children received a curative dose of chloroquine on the day of vaccination, and pyrimethamine one week later.

2. The follow-up days were the 5th, 7th to 12th inclusive, and the 21st after vaccination. All children who were unwell on the 12th day were seen again on the 13th or 14th day.

3. At each attendance rectal temperatures were taken, and any complaints or abnormal physical findings were recorded on a special card. Follow-up was undertaken by one medical officer and two experienced health visitor/nursing sisters. Any child seen by the nursing sisters with fever of over 101°F. (38.3°C) or with special conditions was referred to the medical officer. Children who were unwell were treated according to the findings. No child was given chloroquine unless a flood film had been taken for examination to exclude the possibility of a malarial infection causing pyrexia.

4. The personnel responsible for follow-up took no part in the actual vaccination procedure, and were kept unaware of the vaccination status of the children.

5. Any child who developed a serious complaint was referred to the Wesley Guild Hospital, Ilesha, where the medical superintendent had a copy of the vaccination code.

#### Antibody Studies

Finger-prick blood samples were taken on to filter paper discs on the day of vaccination and on the 21st postvaccination day. Paired samples were eluted and measles antibodies were determined by the haemagglutination inhibition method.

#### Assessment of Clinical Reactions

On the 15th postvaccination day the records of all children in the trial who had satisfied follow-up requirements were scrutinized by 2 physicians. From the data recorded an assessment was made whether or not the subjects had shown evidence of a measles-like illness and whether they had been well or unwell. The reasons for assessing a child as unwell were recorded. In order to avoid any bias in this assessment, the record cards were shuffled to break the numerical sequence, and the serial number on each card was kept concealed until after the assessors had recorded their assessment.

#### Temperature Responses

The following points are worthy of note:

1. Daily mean temperatures were significantly higher in the Rubeovax group than in the Wellcovax group and the control group.

2. When the daily mean temperatures are plotted showing two standard deviations of the mean for the Rubeovax and Wellcovax groups, there is a statistically significant difference between the two groups.

3. The incidence of pyrexia of 101°F. or over was significantly higher in the Rubeovax group than in the Wellcovax group ( $P < 9.05$ ). The difference between these two groups is even more pronounced when considering temperatures of 103°F. or more ( $P < 0.01$ ).

4. The difference between pyrexias recorded in the Wellcovax group and the smallpox only group were not statistically significant ( $< 0.05$ ).

5. There were 44 child/day attendances with fever of 103°F. and over out of 614 child/day attendances among the Rubeovax group. Corresponding figures for the Wellcovax group were 13 out of 680 child/day attendances, and 6 out of 304 child/day attendances for the smallpox only group. The



Table I — Clinical Reactions

	Rubeovax Group (93)	Wellcovax Group (99)	Smallpox Only Group (45)
% with rash	44.1	40.4	15.5
% with rash and fever of 100°F. and over	43.0	39.4	13.3
% with cough	34.4	38.4	35.5
% with coryza	73.1	61.6	62.2
% with conjunctivitis	2.1	4.0	4.4
% with diarrhoea	29.0	19.2	20.0
% with faucial inflammation	31.2	16.2	0
% with natural measles	1.1	0	2.2
% with malaria	1.1	3.0	0
% with smallpox vaccination take	97.8	96.9	100
% assessed as unwell	25.8	11.1	8.9

difference between the Rubeovax group and the other two groups is highly significant ( $P < 0.001$ ).

Treatment for children with fever of 103°F. and over was tepid sponging and aspirin. In the Rubeovax group 16 children required tepid sponging—one of them on four consecutive days, two on three consecutive days, two on two consecutive days, and the remainder on one occasion only. In the Wellcovax group eight children required tepid sponging, two of them on two consecutive days; four children in the smallpox vaccine group required this treatment on one day only. The difference in the treatment rate between the Rubeovax group and the other two groups is significant at the 95% level of confidence.

#### Clinical Findings

Table I compares the incidence of various clinical reactions among the three groups. The significant finding in this Table is the higher proportion of children assessed as "unwell" in the Rubeovax group as compared with the other two groups ( $P < 0.05$ ).

It should be noted that some of the conditions for which children were assessed as unwell were clearly not related to the vaccination procedure. Three of the 24 "unwells" in the Rubeovax group, 5 of the 11 in the Wellcovax group, and all four in the smallpox only group fell into this category.

Faucial inflammation was observed in 31.2% of the Rubeovax group and in 16.2% of the Wellcovax group. No faucial inflammation was noted in the smallpox only group. The difference between the incidence of faucial inflammation in the Rubeovax and the Wellcovax groups was statistically significant ( $P < 0.05$ ).

A number of parents complained of "twitching" or "jerking" in their children, usually associated with high fever. Five in the Rubeovax group and three in the Wellcovax group complained of this symptom, but none in the smallpox only group. Careful questioning of the mothers of these children usually failed to elicit evidence of a true convulsion. It was concluded that these symptoms were a manifestation of restlessness associated with fever, and not genuine convulsions.

One patient in the Wellcovax group developed convulsions and tetany on the second day after vaccination and was later admitted to the Wesley Guild Hospital. This patient had received native medicine. Spasmophilia persisted for several days. The patient responded slowly to treatment with calcium gluconate and sedatives. He was given antibiotics for a respiratory infection which developed in hospital, and recovered completely. The nature of the symptoms in this patient and their time of onset suggest that this illness was incidental and not related to vaccination.

#### Response to Smallpox Vaccination

The incidence of successful primary vaccinations was 97.8% in the Rubeovax group, 96.9% in the Wellcovax group, and 100% in the smallpox only group. From questioning the mothers it seems likely that at least 2 of the children who failed to "take" may in fact have missed their smallpox vaccine injection. There were only 5 children who failed to "take" and 4 of them were aged 2 or more. There

was no evidence of significant interference between the measles and smallpox vaccines.

The great majority of children developed lesions of 1 cm. or less in diameter which showed the classical characteristics of primary vaccination.

#### Antibody Responses to Measles Vaccination

Antibody responses determined on paired serum samples by haemagglutination inhibition method gave the following results:

*Rubeovax Group.*—There were 80 paired serum samples, of which 6 (7.5%) showed antibodies in the first sample. Of the 74 initially nonimmune children 93.2% showed satisfactory antibody conversions. The geometric mean titer of the post vaccination samples was 140.

*Wellcovax Group.*—There were 91 paired serum samples, of which 10 (11.0%) showed antibodies in the first sample. Of 81 initially nonimmune children 87.6% showed satisfactory development of measles antibody. The geometric mean titer of the postvaccination samples was 89.

#### Discussion

Findings in this trial clearly show that clinical reactions to simultaneous measles and smallpox vaccination are more frequent and severe with *attenuated* measles vaccines than with *further attenuated* measles vaccines. The differences observed in temperature responses and "unwell" rates in the 2 measles vaccine groups in this trial are statistically significant.

Serological findings, on the other hand, confirm that both measles vaccines used are effective immunizing agents. The overall antibody conversion rates were similar in the 2 measles vaccine groups. The difference observed in the geometric mean titers of measles antibody in the postvaccination bloods between the attenuated and further attenuated measles vaccine groups accords with findings reported in other trials in which these vaccines were compared. It has not been demonstrated to date that the difference in geometric mean titers achieved by the two classes of live measles vaccine reflects a difference in the protection afforded against the disease.

The subjects in this trial were selected healthy children who were protected from malaria during the period of the trial. It can be anticipated that reaction rates in unselected groups of children not protected from malaria will probably be somewhat higher than those recorded here. If mass measles plus smallpox vaccination is undertaken in Nigeria

with attenuated measles vaccine significant reactions will be provoked in more than 30% of the children vaccinated.

The findings in this respect are similar to those observed in a combined measles plus smallpox vaccination study undertaken recently in Togoland. If, on the other hand, mass vaccination is undertaken with further attenuated measles vaccine the anticipated incidence of significant reactions will be in the region of approximately 10%. This reaction rate is very similar to that observed in the group of children who received only smallpox vaccine.

Medical services in developing countries could be disorganized by a sudden general increase in demands for medical attention by a section of the population. If mass measles plus smallpox vaccination were undertaken in such countries in the immediate postvaccination period, there would be an increased demand for medical attention. The size of this increase would be directly proportional to the reactogenicity of the vaccines employed. It can be estimated that the use of attenuated measles vaccines will create at least a 3-fold greater demand for medical attention than the further attenuated measles vaccines.

These findings indicate that simultaneous measles and smallpox vaccinations on a large scale would be a justifiable procedure if further attenuated measles vaccine strains were used.

#### Summary

The need for a trial comparing the *attenuated* and *further attenuated* measles vaccines given simultaneously with smallpox vaccine is discussed.

A comparative trial of attenuated measles vaccine given simultaneously with smallpox vaccine, further attenuated measles vaccine with smallpox vaccine, and smallpox vaccine given alone is reported. Clinical assessment of 237 children showed that those who received attenuated measles vaccine plus smallpox vaccine had significantly higher fever and morbidity rates than those given either further attenuated measles vaccine plus smallpox vaccine or smallpox vaccine alone. The measles antibody responses in initially susceptible children were satisfactory in both groups given measles vaccine. The incidence of successful primary smallpox vaccinations was between 97 and 100% in all groups. The results of this trial show that a further attenuated measles vaccine given simultaneously with smallpox vaccine would be preferable to an attenuated measles vaccine given with smallpox vaccine in a developing country.

## HYPERSENSITIVITY TO PENICILLIN

*Lancet* 1(7501): 1204, June 3, 1967.

Although the penicillins are the least toxic of all antibiotics so far as effects on liver and kidney function, bone marrow, and foetus are concerned, they are the most likely to cause hypersensitivity reactions. The recorded incidence of such reactions varies between 1 and 10%, and the mortality in severe reactions may be between 9 and 13%. Sensitization may occur not only from therapeutic administration of the drug, but from such sources as milk and dairy products.

A good history is of the utmost importance in diagnosing penicillin hypersensitivity. Parker found 1.4% reactions in patients with a negative history and 30% reactions in those with a positive history. Skin tests are popular but unreliable and are potentially dangerous for two reasons. First, they may cause severe anaphylactic reactions in hypersensitive patients, and, second, the small dose used may be sufficient to sensitize a patient. The penicilloylpolylysine skin test was developed in an attempt to reduce these hazards, but the results obtained by various investigators have varied. Serological tests involving agglutination and haemagglutination have been developed, and haemagglutinating techniques in particular show a high degree of specificity; but the tests are difficult and costly, and unsuitable for routine investigations. The value of the basophil degranulation test introduced by Shelley has yet to be finally determined.

There is uncertainty as to which part of the penicillin molecule is responsible for hypersensitivity

reactions. Following the isolation of the penicillin nucleus, 6-aminopenicillanic acid, it was found that its various derivatives shared cross-sensitivity. Although the side-chain could influence immunological reactions, it was obvious that the nucleus played a fundamental role in their production, and Stewart concluded reasonably that all penicillins derived from 6-aminopenicillanic acid would cross-react in allergic patients. It was possible, however, that hypersensitivity might be due to an impurity derived from the nucleus which could be removed from the therapeutically active material and so reduce the incidence of allergic reactions.

Work reported by G. T. Stewart indicates that this is true, and that standard preparations of 6-aminopenicillanic acid and benzylpenicillin contain at least 2 separate complexes of high molecular weight, neither of which has antibacterial potency, but which evoke reactions in hypersensitive patients. Whereas 19 out of 20 volunteers investigated by Dr. Knudsen gave positive responses to commercially available benzylpenicillin, only half reacted to purified benzylpenicillin from which the impurity had been removed. It is evident, nevertheless, that the purified preparation will continue to provoke hypersensitivity reactions in many patients, and that techniques for identifying such patients are urgently required. Meanwhile, these results give encouragement to continue the research for modifications of penicillin structure which will maintain its antibacterial potency while reducing the risks of hypersensitivity.

(The references may be seen in the original article.)

## KNOW YOUR WORLD

### Did You Know?

That during April 1967, an Army laboratory in South Vietnam conducted a survey for meningococcal carriers?

From the total number of persons studied, 1 Group A, 1 Group C, and 7 Group B strains were identified. All these strains were sulfadiazine resistant. The Group A strain was not inhibited by 1 mgm % of sulfadiazine, but was inhibited by 5 mgms %. All strains were positive to penicillin. Sulfonamide-resistant Group A meningococci have

been reported from North Africa, Holland, and Vietnam during the first 6 months 1967.<sup>1</sup>

That more than 300 paralytic poliomyelitis cases with 39 deaths have been reported to 8 July 1967 from Nicaragua?

Approximately 90% of the cases have been in children under 4 years of age. A vaccination program was carried out in 1,500 centers in all 16 departments of Nicaragua. Type I poliovirus was isolated from stool specimens from paralytic cases at the Middle American Research Unit in Panama.<sup>2</sup>



That for the first 28 weeks of 1967, 55,693 cases of measles were reported?

This is the lowest total reported for this time interval since national morbidity reported was started in 1912. In 1962 there were 427,799; 1963 - 344,-726; 1964 - 449,397; 1965 - 232,261; - 1966 - 182,-610 cases.<sup>3</sup>

That the Florida State Board of Health was formed in 1889 following the 1888 yellow fever epidemic in Jacksonville which caused 10,000 persons out of the 26,800 Duval County to flee the area?

Up to that time, there were independent county and city boards of health, which were more concerned with protecting their own areas against diseases than in a statewide program.<sup>4</sup>

That distribution of chloroquine-medicated salt has been proposed as an alternative method of malaria eradication where insecticidal attack is not fully effective?

A small trial was conducted in Uganda during 1964-1966 to test the use of medicated salt among a changing population at 2 sugar estates. Salt containing 0.38% by weight chloroquine base was issued free. The populations' experience was compared with those not receiving medicated salt. Methods for the preparation and distribution of medicated salt are described in the original article. Satisfactory distribution led to significant reductions in crude parasite rates and reduction of morbidity to about 1/3 the level in nonrecipient workers, and to lower levels in women and children. Failure to achieve complete protection was attributed to administrative shortcomings, individual noncooperation, or inadequate intake. The possibility of chloroquine resistance was excluded by use of a standard test procedure. The results of the trial were not encouraging for wider adoption, but could be justified for the situation in which it was tried.<sup>5</sup>

That 5,000 newborn babies in the San Francisco area are being tested to find out how widespread is the congenital form of a parasitic disease called, "toxoplasmosis"?

Estimates are 1 in 1,000 to 2,000 babies, although a large survey showed the disease to occur at a rate of 0.7 cases per 1,000. The ailment occurs less seriously in adults. With babies, damage can be done before symptoms appear. Untreated, unrecognized toxoplasmosis can cause tissue destruction, with mental retardation and blindness. How the infection is acquired originally is not known, but

certain animals such as dogs, rats and hogs are the apparent source of the parasite *Toxoplasma gondii*. Up to now the most important diagnostic procedure for toxoplasmosis has been the Sabin-Feldman dye test for toxoplasma antibody. This test usually becomes positive in a week or so after infection, but response is sometimes delayed as long as one month. Recently, a simple technic requiring only 2 hours was reported to the Advisory Committee on Medical Research of the Pan American Health Organization. Dry toxoplasms and a small sample of the baby's blood serum are placed on a slide with fluorescent-tagged antiserum from a goat, having the disease. If the baby has been infected the material fluoresces.<sup>6</sup>

That Jingles, a Kentucky black-and-brown canine of mixed ancestry, is a celebrity in doggy circles because of the gold crowns on her teeth?

A practicing dentist in Louisville, Ky., adopted Jingles after finding her wandering around a shopping center near his office. At the time, Jingles had very little hair and a temperature of 103°F, and was lethargic. Massive antibiotic therapy eliminated the infection, but in the months that followed, it became apparent that the enamel on 2 of the dog's teeth was deteriorating, and the dentist decided to apply gold crowns. A former EIS veterinary officer with the NCDC, Atlanta, and now in private practice assisted. After anesthetizing Jingles, they put her on a board lying across the arms of a dental chair. The dentist drilled the teeth, made impressions, and applied temporary dental silicate restorative materials. The first session took 1½ hours. The crowns were cast, and 7 days later each crown was polished, placed on a tooth, and tested for proper fit, then cemented in place. That was 10 months ago: the crowns still are serving the dog well. Jingles' teeth are checked every other week and are expected to last indefinitely.<sup>7</sup>

That *Trogoderma* spp. are common insects in a variety of packaged, prepared food products?

These beetles are not normally directly associated with human illness, but the increasing use of convenience foods requiring little or no cooking prior to human consumption may result in increased health hazards. Two cases of enteric canthariasis in infants are described: 1 case caused by *Trogoderma glabrum* and the other attributed to *Trogoderma ornatum*. The symptoms, the presence of *Trogoderma* spp. larvae in the stool in one instance, and in the precooked cereals fed to the infants, are consistent with enteric canthariasis. In another case, a research

worker developed severe allergic symptoms as a result of continuous exposure to laboratory colonies of *Trogoderma*. A check list of various food-stuffs subject to infestation by *T. glabrum*, *T. ornatum*, and *T. parabile* is provided in the article.<sup>8</sup>

That in India estimates set the number of rats and other rodents as high as 4,800 million as against 472 million humans, or 10:1?

In the United States, rats number about 100 million compared to almost 195 million humans.<sup>9</sup>

## References

1. USDHEW PHS CDC Morb & Mort Wkly Rpt 16 (27): 228, July 8, 1967.
2. USDHEW PHS CDC Morb & Mort Wkly Rpt 16 (27): 228, July 8, 1967.
3. USDHEW PHS CDC Morb & Mort Wkly Rpt 16 (28): 238, July 22, 1967.
4. Florida State "Hlth Notes" 59(7): 280, July 1967.
5. S.A. Hall, et al, Amer J Trop Med & Hyg 16 (4): 429-442, July 1967.
6. Sci News 91 (24): 594, June 24, 1967.
7. USDHEW PHS CDC Veterinary Public Hlth Notes, p 7, July 1967.
8. Calif Vector Views 14(3): 19-22, March 1967.
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## EDITOR'S SECTION

### COMMANDANT OF MARINE CORPS PRAISES NAVY HOSPITAL CORPSMEN

GEN Wallace M. Greene, Commandant of the Marine Corps, in a personal letter to the Surgeon General, VADM R. B. Brown, praises the Navy Hospital Corpsmen serving with the Marines. The following is an extract from that letter:

. . . I am sure that these Corpsmen must know the great respect we Marines hold for them is both enduring and undiminished, and that our genuine appreciation for their continuing contribution to our Country, the Navy and the Corps will be everlasting.

Navy Corpsmen are first-stringers on our combat team, and we would have it no other way. . .

### NOTICE TO ALL FLIGHT SURGEONS

Subj: Changes in Visual Standards  
for Naval Aviators

Ref: (a) MANMED Page Change 39 of 7 July 1967

(b) MANMED 15-62(11) (b)

(c) MANMED 15-62(11) (c)

(d) MANMED 15-62(21) (c)

(e) MANMED 15-62(21) (a)

(f) MANMED 15-67( 1) (a) and (b)

1. Reference (a) revises and updates certain portions of the Aviation Section (Section V). Chapter 15 of the Manual of the Medical Department. The most important changes are concerned with the visual standards for Service Group I aviators.

2. Basically the new change, as set forth in reference (b), lowers the standard for visual acuity for Service Group I to 20/50 and requires the wearing

of glasses while flying when the visual acuity is less than 20/30. Attention is invited to reference (c) which requires the corrected visual acuity be recorded in the right-hand portion of item 59 and the corresponding prescription will be entered in item 60 of SF 88.

3. As a precautionary measure, the total myopic and/or astigmatic error is limited to a total of -1.25 diopters by reference (d). Reference (e), which was modified by page change 37 of 24 April 1967, now requires the report of a refraction in item 60 of SF 88 whenever the visual acuity falls to 20/30 or below and subsequently whenever a further decrement in visual acuity is recorded.

4. To avoid misunderstanding, it is emphasized that the broadening of Service Group I visual standards encompasses only minor degrees of myopia and/or astigmatism. Changes due to presbyopia are excluded. Defective accommodation, as before, will require an aviator to be placed in Service Group II, as will refractive error in excess of those noted in references (b), (c) and (d). It should be noted that there has been no change in the visual acuity standards for candidates for flight training, nor in the maximum hyperopic error allowed (reference (f)).

5. It is essential that aviators who are required to wear glasses to qualify for Service Group I flight status be fitted with spectacle frames which are compatible with their flight gear. The only frame approved for pilot use is the flying goggle (FG-58) frame which has been issued to aircrewmembers as aviators' sunglasses, either prescription or plano, for the past several years. This frame is standard for flight personnel in the Army, Navy and Air Force. These frames have been thoroughly evaluated both from a comfort standpoint and for compatibility with

standard flight helmets, oxygen masks and the full pressure suit helmet.

6. Experience with the frame on sunglasses has shown that with proper fitting and adjustment, the spectacles possess the necessary degree of security and field of view for wear during carrier operations. Flight Surgeons must assure themselves that each pilot, wearing either clear or tinted (N-15) prescription lens, has the proper frames individually adjusted to his face.

7. Prescription glasses are ordered on DD Form 771 (Apr 1954 or Dec 1966) and a separate form is required for each type of spectacle ordered. If clear glasses are desired, check the block indicating "Flying Goggles—Clear" on the form. If sunglasses are also being ordered, fill out a second form, checking the block marked "Sunglasses—N-15," or noting this same information under "Details" on older DD Form 771.—AeroMed, BuMed.

### LYSERGIC ACID (LSD)

*The following, which was prepared by CAPT J. D. Wilson, MC USN, Code 313, BuMed, is recommended reading for All Hands:*

Lysergic acid diethylamide tartrate (LSD, "Acid") was first synthesized in 1938. Since that time, medical-experimental studies have been conducted with the drug, ranging from comparison of LSD-induced "model psychoses" with schizophrenic psychoses to treatment of specific disorders such as alcoholism. It must be emphasized that this is still an experimental drug. None of the therapeutic claims for LSD has been firmly substantiated. Current controlled experiments have even cast doubt on results of earlier research.

Since mid-1965, the mass media has extensively publicized LSD, too often presenting it as a panacea for a variety of problems of living, improvement of personality, and as an efficacious drug which enhances religious experience and creativity in the arts.

Contrary to the claim that LSD is a "consciousness-expanding" drug, it has been clearly demon-

strated to decrease conscious functions, to decrease an individual's ability to select and pay attention, and to impair critical, objective judgment. Visual and auditory acuity are distorted, not enhanced as claimed. There are severe side effects from LSD, both acute and chronic. There is no known method of predicting occurrence or sudden unexpected recurrence of these dangerous side effects long after use of the drug. It is not possible to select in or out those individuals likely to suffer these adverse side effects.

Thus, sensitivity to the drug varies widely and cannot be predicted. Country-wide observations indicate the untruth of the statement that overdosage of the drug alone is responsible for the severe reactions of fear, panic and psychosis. Since April, 1966, when the only licensed producer of this hallucination-inducing drug stopped its distribution, the only available source (other than authorized, carefully controlled research supplies) has been the black market. As with most other illicitly manufactured drugs, black market LSD invariably contains impurities and the amount of active ingredient varies widely. Occasionally even more dangerous drugs are substituted and sold as LSD; overdosage of such common substitutes as belladonna can result in a particularly unpleasant form of death.

As a result of indiscriminate, wide-spread use of LSD since the spring of 1965, there has been an alarming increase in the number of patients seen in clinics, hospital emergency rooms and state mental institutions because of adverse reactions. Common reactions are of three main types: Acute severe panic episodes during which suicide attempts, suicides or homicides have resulted; recurrence of incapacitating symptoms without warning during a period of abstinence even months after taking the drug; and prolonged psychosis. Preliminary results of recent research indicate a distinct possibility of a permanent alteration of brain functioning due to the use of LSD and further an indication that LSD may effect basic structure of body cells in such a manner as to produce inheritable defects.



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